Innovations in Agriculture 2018, 1(2): 24-27
doi: 10.25081/ia.2018.v1.i2.1028
http://updatepublishing.com/journals/index.php/ia

Regular Article

ISSN: 2617-1295

Profitability analysis of normal season and off-season muskmelon cultivation in district Sialkot, Pakistan

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Received: March 22, 2018
Accepted: June 09, 2018
Published: June 18, 2018

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ABSTRACT

A field survey was conducted during 2016 to estimate the profitability of normal season and off-season muskmelon cultivation in district Sialkot, Pakistan. The primary data was collected from forty farmers with convenience sampling method. Economic parameters like net return and BCR were employed. Off-season muskmelon cultivation was found economically feasible due to additions of yield (17%), gross income (122%), profit (161%) and market price (90%) in comparison to normal season crop. Therefore, it is recommended to cultivate the off-season muskmelon (BCR 3.26) to obtain more profit and fulfill the customer demand in less supply period instead of normal season cultivation (BCR 2.44).

KEYWORDS: Low plastic tunnel, muskmelon, off-season, profitability, sialkot

INTRODUCTION

Muskmelon is the fourth important fruit in world fresh fruit market [1]. It is key source of vitamin C, calories, fat and beta carotene being low in sodium [2]. For taste and sugar of muskmelon, there are some climatic requirements like Hot dry air and sunshine. Similarly, the temperature of 27-29° C is most suitable for germination. If irrigation facilities are not there, the soil should be clay soil [3].

Pakistan has suitable climate and productive soil to cultivate not only major crops but also vegetables and fruits. The main vegetables cultivated are tomato potato, onion, chillies, melon and other cucurbits [4]. A maximum portion (57%) of the rice-wheat area is reported in Punjab. The rice-wheat area of Punjab mainly consists of Sialkot, Gujranwala and Sheikhupura along with some parts of Lahore and Gujrat districts due to more area share of basmati rice [5]. In rice-wheat cropping zone the maximum cultivation of water & muskmelon (60.24%) has been reported in district Sialkot [6]. The detail is given in Table 1.

Due to inadequate vegetable processing industry and storage infrastructure in Punjab, the off-season vegetable farming in plastic tunnel (in which temperature is controlled for the growth) may be the only possible option that will add value to the farmer's produce. During the field survey it was observed that the progressive farmers had installed walk-in as well as low plastic tunnel in all the four tehsils of district Sialkot for cultivating off-season cucumber, tomato, green chilli, bitter gourd, watermelon and muskmelon etc. to furnish with demand during the less supply period. The yield of vegetable cultivated in the tunnel was clearly more than traditional farming. Thus this plastic tunnel technology has reduced the need for imports and fulfills the domestic demand.

Plastic tunnel to grow vegetable crops may be of three types i.e. low, medium (walk-in) and high. Walk-in plastic tunnel provide better yield in comparison to low plastic tunnel by bearing the infrastructure cost of Rs 120,000 acre^{-1}. High plastic tunnel gave optimum yield for infrastructure cost of Rs 600,000 acre^{-1} to provide soil preparation, spraying and picking operations easier because of its more height and width. Plastic low tunnel was economical than high and walk-in plastic tunnel by bearing Rs 30,000 acre^{-1} infrastructure cost. Mostly, small farmers opted for low plastic tunnel [7]. To cultivate the off-season muskmelon low plastic tunnel observed to be the reasonable option during field survey.

As land holding size is decreasing day by day due to division of land and increasing housing colonies, hence there is need to raise profit per unit area. Higher profit margin in lesser supply time might be the reason for cultivating off-season fruit and vegetable in plastic tunnel technology. No profitability analysis was available for off-season muskmelon in rice-wheat cropping zone. Therefore this research study was planned to conduct the profitability analysis which could exemplify the guidelines for farmers to continue off-season muskmelon (plastic tunnel technology) cultivation or to rely on normal season muskmelon production.

MATERIALS AND METHODS

The field survey was conducted during year 2016 to estimate the economics between normal season and off-season muskmelon cultivation. The primary data was collected by purposively selecting district Sialkot due to more cultivation area of water & muskmelon in rice-wheat cropping zone of Punjab, Pakistan [6]. Then to select the respondent farmers the convenience sampling method was employed by keeping in view the cost and time constraints. The data from each tehsil i.e. Daska, Sambrial, Pasrur and Sialkot was collected equally (ten farmers for each tehsil in which five were normal season growers and five were off-season growers of muskmelon) to make a total interviews of 40 farmers. A well planned and pre tested questionnaire was used to gather information from the selected farmers.

Economic parameters like net return and BCR for both practices were calculated to find out the most practicable and profitable way. For profitability analysis the same methodology has been adopted previously [8, 9, 10, 11].

RESULTS AND DISCUSSION

The farmers that were cultivating off-season muskmelon (mid November to mid May) in plastic low tunnel were more educated, less experienced and having more land size than normal season growers. However they were allocating less acreage of land (5.14 hectare) for muskmelon; might be due to more infrastructure expenditure incurred than normal season growers (11.12 hectare). Less seed rate application was recorded in off-season muskmelon (0.74 kg/ha) in comparison to normal season cultivation (0.99 kg/ ha) because in this technology higher quality/hybrid seed was used of nearly 100% germination. More tillage operations (46%) were observed for land preparation as well as more tube well irrigations (33%), fertilizer application (36%) and pesticides applications (40%) were recorded in off-season muskmelon as compared to seasonal muskmelon cultivation (Figure 1 and Table 2).

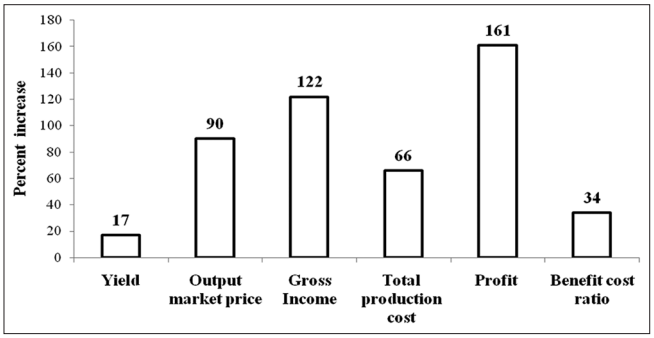

Figure 1: Percent increase due to off-season cultivation

Table 1: Area of water and muskmelon in major districts of rice-wheat cropping zone

District (year)/ Unit	Rice (2014-15)		Wheat (2014-15)		Water and muskmelon (2015-16)	
Area	'000' ha	% share	'000' ha	% share	hectare	% share
Sialkot	139.61	24.14	211.24	31.71	1012	60.24
Gujranwala	238.36	41.22	233.1	34.99	425	25.30
Sheikhupura	200.31	34.64	221.76	33.29	243	14.46
Total	578.28	100	666.1	100	1680	100

For off-season muskmelon cultivation all the farmers were adopting low plastic tunnel. In the construction of low plastic tunnel the basic required material was wooden sticks for frame/ structure, string, black polythene sheet for weed control and transparent plastic sheets bearing a total annual cost of Rs 68,612 ha^{-1}. The plastic sheet was used to avoid frost, rain and cold air from outside. Enhanced soil fertility, better moisture conservation, controlled temperature, protection from insects and wild animals were the reported benefits of plastic low tunnel.

Black polythene sheet was utilized for mulching purpose. Mulching was a management practice to enhance the water use efficiency [12]. Controlling weeds, enhancing soil moisture conservation, reducing soil evaporation an decreasing nutrient leaching are the benefits of mulches [13, 14].

Land preparation was the initial step to obtain the optimum yield. The land preparation cost ha^{-1} for off-season as well for normal season muskmelon cultivation was recorded as Rs 19298 and Rs 13388 respectively. The more irrigation expenses (36%) were estimated in off-season muskmelon. The muskmelon yield was greatly influenced by total irrigation

Table 2: Comparative description of normal and off-season muskmelon cultivation

Description	Unit	Normal season	Off-season (plastic low tunnel)
Education	Year	6.5	7.6
Experience	Year	3.12	2.14
Area owned	Hectare	25.19	48.66
Area under cultivation	Hectare	35.82	51.87
Area under muskmelon	Hectare	11.12	5.14
Land rent	Rs.ha-1	92378	94972
Family labor	No.	1.21	1.54
Permanent hired labor	No.	1	1.6
Wage per permanent labor	Rs.month-1	5200	5435
Date of sowing	Month	February	mid Nov. to mid Dec.
Cultivator used	No. ha^{-1}	6.2	8.0
Disc harrow used	No. ha^{-1}	3.7	5.9
Rotavator used	No. ha^{-1}	1.7	3.0
Seed rate	Kg ha^{-1}	0.99	0.74
Tubewell irrigation	No. ha^{-1}	17.3	23.0
Urea applied	Bag ha^{-1}	2.5	3.5
DAP applied	Bag ha^{-1}	2.0	3.0
FYM applied	Tons. ha^{-1}	6.1	7.5
SOP applied	Bag ha^{-1}	0.6	1.2
Hoeing	No. ha^{-1}	6.7	4.9
Pesticide spray	No. ha^{-1}	12.4	17.3

water applied [15]. Studies on irrigation had revealed that the muskmelon was responsive to water stress [16]. Therefore providing the optimum irrigation water quantity to muskmelon plants was essential for maximum yield [17]. Farmyard manure (FYM) application was required to keep the plant productive and healthy as it fulfills the nutritional requirements of the plant. FYM contains about 0.4 per cent P_2O_5, 1.7 per cent K_2O and 0.1 percent N [18]. Overall the fertilizer cost ha^{-1} for off-season and normal season muskmelon cultivation were Rs 7146 and Rs 5273 respectively as the detail is given in Table 3.

The sale price variation was recorded significantly in muskmelon production (Rs 558 to Rs 1570 $mound^{-1}$ for off-season plastic low tunnel while Rs. 500 to Rs. 620 $mound^{-1}$ for normal season). The mean output price of Rs 26.6 kg^{-1} was estimated for off-season muskmelon production while it was about Rs 14 kg^{-1} for normal season muskmelon production. Availability and supply of substitute fruits in the market was the key reason for low price of normal season produce.

Benefit cost ratio (BCR) for normal season was recorded as 2.44 while it was 3.26 for off-season muskmelon cultivation in rice-wheat cropping zone. Some researcher also concluded more returns for winter muskmelon (1.85 BCR) than summer muskmelon (1.77 BCR) [3]. While some one projected BCR for large and small farmers of muskmelon as 3.37 and 4.73 respectively [19]. Off-season muskmelon cultivation was found economically feasible due to increase in yield (17%), income (122%), profit (161%), market price (90%) and benefit cost ratio (34%) than normal season. The detail is given in Table 4.

Table 3: Comparison for cost of production ha^{-1} (Rs)

Description	Normal season	Off-season (plastic low tunnel)
Land rent for crop period	38492	55400
Tunnel structure		
Tunnel plastic sheet	0	46708
Wood sticks etc., for frame/ structure	0	10591
Plastic string	0	939
Black polythene sheet	0	10374
Land preparation		
Cultivator	5002	6504
Disc harrowing	3335	5335
Rotavator	2334	4001
Bed/ridge making	2717	3458
Seed and planting		
Seed	35030	37675
Seed treatment (if yes)	136	141
Planting	1235	1260
Irrigation	5273	7146
Urea	4619	6479
DAP	7410	11300
Fertilizer		
FYM+labor cost	5397	7931
SOP	3399	6237
Other micro nutrients	432	509
Weed control		
Hoeing	12844	8126
Weedicides	5459	3829
Pesticide (including) labor cost	7138	11152
Harvesting	12350	13585
Transportation/marketing	10423	11411
Total cost of production	163025	270090

Table 4: Economic Analysis of normal and off-season muskmelon cultivation

Parameter	Unit	Normal season cultivation	Off-season cultivation	% change (increase)
Yield	mounds ha^{-1}	709	827	17
Output market price	Rs. Kg^{-1}	14	26.6	90
Production cost	Rs. Kg^{-1}	5.75	8.16	42
Gross Income	Rs. ha^{-1}	396978	880407	122
Total production cost	Rs. ha^{-1}	163025	270090	66
Profit	Rs. ha^{-1}	233953	610317	161
Benefit cost ratio		2.44	3.26	34

CONCLUSION

It was concluded that the average profit kg^{-1} of muskmelon were Rs 8.25 and Rs 18.43 for normal season (2.44 BCR) and off-season cultivation (3.26 BCR) respectively. It is therefore recommended to cultivate the off-season muskmelon (plastic low tunnel) in rice-wheat cropping zone to obtain more profit and fulfill the customer demand during less supply period.

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